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Capillary interactions among colloidal spheres at a curved liquid interface CHUAN ZENG, UMass Amherst, F. BRAU, Universite de Mons, B. DAVIDOVITCH, A. D. DINSMORE, UMass Amherst — Colloidal particles tend to adsorb on liquid interfaces, where in-plane interactions can arise from a variety of mechanisms. We focus on capillary interactions induced by the curvature of the liquid interface, where particles were assumed to have a constant Young-Laplace contact angle at the three-phase contact line. Whereas spherical particles can adsorb on flat or spherical interfaces without deforming the interface, we predict that adsorption on a cylindrical interface deforms the interface because of the lack of azimuthal symmetry around the contact line. We present an analytical model of the interfacial shape and energy upon adsorption of single particle as well as the interaction between two particles. Long-range deformation of interface was found from the solution of a partial differential equation based on constant mean curvature of the interface. The binding energy will be discussed as well as interactions between particles. The results will be compared to predictions of a simpler model that assumes a nearly flat interface near the adsorbed sphere. This study provides an important step toward understanding the interactions among interfacial particles when the interface is distorted by an external field. We acknowledge support from the NSF-supported MRSEC on Polymers at UMass (DMR-0820506).

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